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Executive Summary

The economic changes associated with globalization tighten financial pressures on governments of high-income countries by increasing the demand for government spending while making it more costly to raise tax revenue. Greater international mobility of economic activity, and associated responsiveness of the tax base to tax rates, increase the economic distortions created by taxation. Countries with small open economies have relatively mobile tax bases; as a result, they rely much less heavily on corporate and personal income taxes than other countries. The evidence indicates that a 10% smaller population in 1999 is associated with a 1% smaller ratio of personal and corporate income tax collections to total tax revenues. Governments of small countries instead rely on consumption-type taxes, including taxes on sales of goods and services and import tariffs, much more heavily than larger countries do. Since the rapid pace of globalization implies that all countries are becoming small open economies, this evidence suggests that the use of expenditure taxes is likely to increase, posing challenges to governments concerned about recent changes in income distribution.

I. Introduction

There is a discomfort current in high-income countries, as governments face excess demand for the services they provide together with difficulty raising revenue needed to finance greater expenditures or even to maintain services at levels to which their populations have grown accustomed. The mismatch of desires and means is an old and common story, hardly unique to governments, and not any easier for its banality. Changing world economic conditions, the globalization of production and markets, and the economic awakening of much of the world's population have contributed to the problems confronting governments of affluent countries even as they have made possible some of the most exciting developments of modern times.

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Economic theory offers insights chiefly into the dire consequences of possible methods that governments might use to address their financial difficulties. Efforts to tax mobile economic activity stimulate mobility and thereby create economic distortions as business activities, capital, and labor are reallocated for tax rather than productivity reasons. Sophisticated tax avoidance through financial and other means reduces the revenue potential of high rates of income taxation and further contributes to the economic cost of taxation. Taxes on capital income distort the intertemporal allocation of consumption due to the compounding of effective tax rates over time. And redistributive taxation that subjects income to high marginal rates of effective taxation creates its own economic distortions.

The economic costs of raising tax revenue are particularly worrisome in an environment in which governments face significant demands on their resources. Despite the greater general affluence associated with globalization, some segments of industrial societies, particularly those relying on returns to less skilled labor, may be adversely affected by resulting price changes. The accompanying social dislocations put pressures on governments to soften the impact of global economic changes[1] and, if possible, respond in ways that help their populations thrive in more globally competitive markets. Social welfare programs for many years have served the first of these functions and education and training programs the second; they are all expensive, so there is understandable interest in the ability of governments to maintain their funding in an era in which most large countries have open economies.

One of the potential challenges for governments that are eager to maintain and possibly strengthen their spending programs is that the same forces that are responsible for recent economic changes might also raise the cost of financing government programs with certain types of taxes. The relative ease of international trade, capital movement, and communication makes it possible for production to locate in many places around the world and for tax burdens to be avoided through international transactions. Since location choices, activity levels, and taxable incomes are sensitive to local tax rates, it stands to reason that governments would feel intensifying international pressure to reduce tax burdens on business activities, investors, and possibly high net worth individuals. If tax rates fall without other compensating changes, then government tax revenues will decline, and with them government expenditures. A general reduction in government expenditures entails reduced outlays on social welfare and education programs, particularly

since there are no countervailing international pressures on governments to maintain this spending.[2]

How then can governments find revenues to finance social spending and other programs without creating enormous economic distortions? Distortions are minimized by taxing bases that are least responsive to taxation. Land is the classic example of a factor inelastic in supply and therefore nondistortionary to tax, though taxing land raises other issues and in any case modern governments require far more revenue than is feasible to obtain from land taxes alone.

A good part of the problem facing governments is the mobility and potential mobility of economic activity. Some aspects of this mobility are clearly observable, taking the form of foreign direct investment by multinational firms, portfolio investment by individuals and financial institutions, international trade, immigration of individuals, international licensing of intangible property, and other forms of international factor mobility. Other features of mobility are more subtle, taking the form of businesses that thrive in locations that heretofore would not have been suitable for them, workforces that need not move because markets come to them, and ideas that are adopted everywhere. In the absence of coordinated government policies, the potential mobility of economic activity makes it extremely difficult for governments to exploit monopoly positions over much of their tax bases, thereby greatly contributing to the distortions created in the course of raising tax revenue.

The behavior of governments during the era of globalization offers clues to the likely course of future developments. Small countries with their relatively more open economies have always faced greater international pressures than large countries, and their fiscal systems therefore had to adapt earlier than large countries to the greater mobility that open markets create. Globalization means that in some sense all countries are becoming smaller. In order to explore the likely consequences for large countries of globalizing trends, it is therefore useful to consider the tax policies that small countries use and, in particular, the way in which their tax policies have differed from those in larger countries.

The evidence indicates that small countries rely much less than other countries do on income taxes imposed on individuals and corporations. While small and more open economies certainly use income taxes, their governments rely much less on these taxes than they do on expenditure-type taxes such as excise, sales, and value-added taxes as well as tariffs on imported goods. The cross-sectional evidence for 1999 is that a 10% smaller national population is associated with a 1% lower ratio of income

taxes to total tax revenue, and panel evidence points to even stronger effects of changes in country size on the use of income taxes.

Expenditure-type taxes have risen in popularity everywhere in the world, as reflected in the fact that more than 130 countries now impose significant value-added taxes, and there is widespread reliance on excise taxes on gasoline and other commodities. The popularity of expenditure taxes is due in part to their administrative and enforcement features and in part to their efficiency properties. In a globalizing world, expenditures have relatively clear geographic associations, reducing the potential for international tax avoidance and generally reducing the mobility of the tax base compared to alternatives such as personal income taxes or source-based business taxes including the corporate income tax. Expenditure taxes do not directly tax capital returns, but do so indirectly by taxing all returns when spent on goods and services, which has the effect of taxing pure profits on capital investments while effectively exempting normal returns to saving.

Heavy use of expenditure taxation in place of income taxation can carry serious implications for tax progressivity, since in practice many expenditure taxes have flat rates that make them much less progressive than income tax alternatives. Absence of tax progressivity is not intrinsic to taxing expenditures, since it is possible to tax lightly goods purchased disproportionately by low-income families, though there are serious limits to the amount of redistribution that can be achieved that way (see, e.g., the analysis in Sah [1983]). It is possible to couple the adoption of new expenditure taxes with offsetting distributional changes in income taxation, as proposed by Graetz (2002) and others, though there are realistic questions about whether countries in practice are capable of enacting such sweeping reforms. Furthermore, there are serious proposals to institute progressive expenditure-type taxes, which could be implemented by countries such as the United States through relatively minor adjustments to existing taxes. In the absence of compensating adjustment to other taxes and expenditures, however, the most likely outcome of greater reliance on expenditure-type taxation is reduced overall fiscal progressivity. Given recent changes in income distributions, governments may be dissatisfied with such an outcome and seek creative alternatives that permit fiscal progressivity to accompany sufficient revenue generation.

II. Tax Policy Pressures on the United States

The world economy has grown considerably more open and integrated in every decade since the Second World War. During the period from

1950 to 2004, total world exports and imports grew by an average of 5.9% a year.[3] While this reflects in part the growth of the world economy, it also reflects the impact of reduced transportation and communication costs, falling tariff rates, and reductions in other impediments to international business. From 1950 to 1975, world exports and imports grew by 2.2% a year relative to world output, and trade in manufacturing grew by 2.6% a year relative to output. From 1975 to 2004 the rate of growth of international trade relative to world output quickened for all goods to 2.3% a year, and for manufacturing to 3.0% a year. The openness of world economies is likewise reflected in a marked growth of foreign direct investment.

Changes to the world economy have coincided with significant changes to the distribution of income in the United States and other high-income countries. Table 1 presents data compiled by the Congressional Budget Office (2007) on shares of pretax income accounted for by different income groups in the United States. The highest quintile of the income distribution received 45.5% of household income in 1979, a figure that rose to 55.1% by 2005. The top 1% of families had 9.3% of total income in 1979, whereas the corresponding figure for 2005 is 18.1%. At the other end of the income distribution, the lowest quintile in 1979 received 5.8% of family income, a ratio that fell to just 4.0% by 2005. By just about any measure, income has become significantly less evenly distributed in the United States over the past 3 decades. There is considerable controversy over the extent to which changes to income distributions in wealthy countries can be attributed to the growth of international trade and investment, though the evidence reviewed by Feenstra and Hanson (2004) strongly suggests that globalization has contributed significantly to income inequality.

The changing income distribution creates demands for the U.S. government to improve the economic prospects of the disadvantaged with education, training, and other programs and to modify the after-tax distribution of income through the tax and transfer system. Creating meaningful new national economic opportunities with education and training programs requires significant expenditures that entail substantial new financing sources, typically in the form of higher taxes. Redistributing income through the tax system also requires high tax rates, including not only taxes on affluent individuals and families but high implicit tax rates on means-tested transfers to low-income individuals and families.

Perhaps the most significant sectoral shift of modern times is the rising fraction of national resources devoted to health spending. The government

Table 1
Pretax Income Shares (%), All Households, by Household Income Category, 1979–2005

Year	Lowest Quintile	Second Quintile	Middle Quintile	Fourth Quintile	Highest Quintile	All Quintiles	Top 10%	Top 5%	Top 1%
1979	5.8	11.1	15.8	22.0	45.5	100.0	30.5	20.7	9.3
1980	5.7	11.0	15.7	22.1	45.8	100.0	30.6	20.7	9.1
1981	5.5	10.9	15.9	22.2	46.0	100.0	30.7	20.7	9.1
1982	5.2	10.6	15.7	22.2	46.7	100.0	31.1	21.1	9.6
1983	4.9	10.3	15.5	22.2	47.7	100.0	32.2	22.2	10.3
1984	5.0	10.3	15.4	22.0	48.0	100.0	32.6	22.6	10.9
1985	4.8	10.1	15.2	21.9	48.6	100.0	33.4	23.4	11.5
1986	4.5	9.6	14.7	21.2	50.6	100.0	35.8	26.0	14.0
1987	4.4	10.0	15.3	22.1	48.9	100.0	33.5	23.4	11.2
1988	4.3	9.7	14.9	21.6	50.3	100.0	35.3	25.4	13.3
1989	4.3	9.8	15.1	21.6	49.9	100.0	34.8	24.8	12.5
1990	4.6	10.0	15.1	21.6	49.5	100.0	34.4	24.3	12.1

1991	4.7	10.0	15.4	21.8	49.0	100.0	33.7	23.6	11.2
1992	4.4	9.7	15.1	21.5	50.0	100.0	34.9	24.7	12.3
1993	4.5	9.8	15.0	21.6	49.8	100.0	34.6	24.4	11.9
1994	4.4	9.8	15.2	21.6	49.8	100.0	34.6	24.5	12.1
1995	4.6	9.7	14.9	21.3	50.2	100.0	35.2	25.1	12.5
1996	4.3	9.4	14.5	21.0	51.5	100.0	36.5	26.5	13.8
1997	4.3	9.1	14.2	20.4	52.6	100.0	37.8	27.8	14.9
1998	4.3	9.0	14.1	20.2	53.0	100.0	38.4	28.5	15.7
1999	4.2	8.9	13.8	19.9	53.8	100.0	39.4	29.6	16.7
2000	4.0	8.6	13.5	19.6	54.8	100.0	40.6	30.7	17.8
2001	4.3	9.2	14.2	20.8	52.3	100.0	37.5	27.4	14.7
2002	4.3	9.3	14.5	21.2	51.5	100.0	36.5	26.3	13.5
2003	4.2	9.1	14.3	21.0	52.1	100.0	37.2	27.0	14.3
2004	4.1	8.9	13.9	20.4	53.5	100.0	38.9	29.0	16.3
2005	4.0	8.5	13.3	19.8	55.1	100.0	40.9	31.1	18.1

Source: Congressional Budget Office (2007).
Note: The income concept is comprehensive family income that includes an adjustment for family size.

is heavily involved in all matters concerning health, so rising health costs together with limits to the ability of private individuals and their employers to finance adequate health coverage put enormous potential burdens on governments to make up any differences. Table 2 presents recent estimates from the Centers for Medicare and Medicaid Services of historical and projected health care expenditures by private individuals and the public sector in the United States. As is evident from this table, annual federal government health spending is projected to rise from its 2006 level of $664 billion to $1.471 trillion by 2017, thereby more than doubling per capita annual federal government spending from $2,217 in 2006 to $4,505 in 2017. Over the same period, state and local governments are projected to increase their per capita annual health spending from $826 to $1,568. Even with this growing support from different levels of government, total per capita private health expenditures, including private health insurance, out-of-pocket payments, and other private expenditures, are anticipated to grow from $3,517 in 2006 to $6,203 by 2017.

Significantly increased public spending on health care requires greater resources for all levels of government. In addition, rising per capita private health care costs contribute to financial burdens on private individuals, particularly those without access to generous employer-provided health insurance. This, in turn, adds to the demand for public support of low-income individuals and families.

Changes to the distribution of income and rising health care expenditures are just two of several trends that contribute to U.S. government revenue needs in the coming years. An aging population requires greater spending on public pensions, including social security and disability insurance, and an aging public infrastructure creates significant needs for greater spending on roads and highways, sewer systems, port and airport facilities, telecommunications, and other elements of public infrastructure. At the same time that the U.S. government faces greater expenditure demands, its ability to finance expenditures is limited by greater mobility of the tax base and competition from other parts of the world for mobile economic activity.

Rising levels of worldwide foreign direct investment have the potential to trigger rounds of competitive business tax reductions, as countries seek to attract the employment opportunities, productivity spillovers, and other economic benefits commonly associated with greater investment, particularly foreign investment. Countries have incentives to reduce business tax rates if they believe that lower tax rates will be associated with greater economic activity, a higher tax base, or both. While evidence of growing foreign direct investment does not by itself demonstrate

that tax policies influence the magnitude and performance of international investment, there is ample separate evidence that they do.

A substantial body of research considers how taxation influences the activities of multinational firms.[4] This literature considers the effects of taxation on investment and on tax avoidance activities. With respect to investment, tax policies are obviously capable of affecting the volume and location of foreign direct investment since, all other considerations equal, higher tax rates reduce after-tax returns, thereby reducing incentives to commit investment funds. This literature identifies the effects of taxes through time-series estimation of the responsiveness of foreign direct investment to annual variation in after-tax rates of return and cross-sectional studies that exploit the large differences in corporate tax rates around the world to identify the effects of taxes on foreign direct investment. The first generation of these studies, reviewed in Hines (1997, 1999), reports tax elasticities of investment in the neighborhood of –0.6. What this means is that a 10% tax reduction (e.g., reducing the corporate tax rate from 35% to 31.5%) should be associated with 6% greater inbound foreign investment. More recent evidence suggests that foreign direct investment is even more tax sensitive than this.[5]

Contractual arrangements between related parties located in countries with different tax rates offer numerous possibilities for sophisticated tax avoidance. It is widely suspected that firms select transfer prices used for within-firm transactions with the goal of reducing their total tax obligations. Multinational firms typically can benefit by reducing prices charged by affiliates in high-tax countries for items and services provided to affiliates in low-tax countries. OECD governments require firms to use transfer prices that would be paid by unrelated parties, but enforcement is difficult, particularly when pricing issues concern differentiated or proprietary items such as patent rights. Given the looseness of the resulting legal restrictions, it is entirely possible for firms to adjust transfer prices in a tax-sensitive fashion without violating any laws. Multinational firms can structure a variety of transactions—intrafirm debt, royalty payments, dividend repatriations, and intrafirm trade—in a manner that is conducive to tax avoidance. Studies of the responsiveness of firms to taxes on these margins examine reported profitabilities, tax liabilities, and specific measures of financial and merchandise trade in order to identify the effects of taxes.[6]

Taken together, this evidence implies that the volume of foreign direct investment, and accompanying economic activity and corporate tax bases, is highly responsive to local tax policies. It follows that countries

Table 2
National Health Expenditures: Aggregate and Per Capita Amounts, Percent Distribution, and Annual Percentage Change by Source of Funds: Calendar Years 2002–17

Year	Total	Out-of-Pocket Payments	Third-Party Payments							
			Total	Private Health Insurance	Other Private Funds	Public				
						Total	Federal[a]	State and Local[a]	Medicare[b]	Medicaid[c]
	A. Amounts in Billions									
Historical estimates:										
2002	$1,603.4	$211.4	$1,392.0	$552.5	$118.4	$721.1	$508.6	$212.5	$265.1	$249.0
2003	1,732.4	224.9	1,507.6	602.8	127.4	777.3	550.7	226.6	281.5	271.6
2004	1,852.3	234.9	1,617.4	645.8	134.1	837.5	597.1	240.4	309.3	292.0
2005	1,973.3	247.1	1,726.2	685.6	143.9	896.8	639.1	257.7	338.0	313.5
2006	2,105.5	256.5	1,849.0	723.4	155.3	970.3	704.9	265.4	401.3	310.6
Projected:										
2007	2,245.6	269.3	1,976.3	769.4	168.1	1038.8	753.1	285.6	427.3	338.2
2008	2,394.3	282.6	2,111.7	821.7	180.8	1109.3	806.8	302.5	460.7	361.2
2009	2,555.1	297.6	2,257.5	878.8	192.9	1185.8	864.3	321.5	495.0	387.9
2010	2,725.8	314.4	2,411.4	936.0	206.3	1269.0	926.5	342.5	531.1	417.7
2011	2,905.1	332.0	2,573.1	995.4	220.3	1357.4	992.2	365.2	568.5	450.5
2012	3,097.8	350.6	2,747.3	1,058.0	234.6	1454.7	1065.3	389.4	610.5	486.0
2013	3,305.0	370.3	2,934.7	1,124.3	250.1	1560.3	1144.7	415.6	656.4	524.6
2014	3,523.6	391.3	3,132.3	1,192.0	266.2	1674.1	1230.3	443.8	705.6	566.6
2015	3,757.0	413.9	3,343.2	1,263.4	282.9	1796.9	1322.6	474.3	758.8	612.4
2016	4,007.8	438.1	3,569.7	1,338.0	300.2	1931.5	1424.3	507.2	818.1	662.3
2017	4,277.1	464.3	3,812.8	1,415.3	318.3	2079.2	1536.2	543.0	884.0	717.3

	B. Per Capita Amount									
Historical estimates:										
2002	$5,560	$733	$4,826	$1,916	$411	$2,500	$1,763	$737	…[d]	…
2003	5,952	773	5,179	2,071	438	2,670	1,892	779	…	…
2004	6,301	799	5,502	2,197	456	2,849	2,031	818	…	…
2005	6,649	833	5,816	2,310	485	3,022	2,153	868	…	…
2006	7,026	856	6,170	2,414	518	3,238	2,352	886	…	…
Projected:										
2007	7,439	892	6,547	2,549	557	3,441	2,495	946	…	…
2008	7,868	929	6,939	2,700	594	3,645	2,651	994	…	…
2009	8,329	970	7,359	2,865	629	3,866	2,818	1,048	…	…
2010	8,816	1,017	7,799	3,027	667	4,104	2,996	1,108	…	…
2011	9,322	1,065	8,256	3,194	707	4,355	3,184	1,172	…	…
2012	9,862	1,116	8,746	3,368	747	4,631	3,391	1,240	…	…
2013	10,439	1,170	9,270	3,551	790	4,928	3,616	1,313	…	…
2014	11,043	1,226	9,817	3,736	834	5,247	3,856	1,391	…	…
2015	11,684	1,287	10,397	3,929	880	5,588	4,113	1,475	…	…
2016	12,369	1,352	11,017	4,129	926	5,961	4,396	1,565	…	…
2017	13,101	1,422	11,679	4,335	975	6,369	4,705	1,663	…	…

Source: Centers for Medicare and Medicaid Service, Office of the Actuary.

Note: Per capita amounts based on July 1 census resident-based population estimates. Numbers and percentages may not add to totals because of rounding. The health spending projections were based on the 2006 version of the National Health Expenditures released in January 2008.

[a]Includes Medicaid State Children's Health Insurance Program expansion and SCHIP.

[b]Subset of federal funds.

[c]Subset of federal and state and local funds. Includes Medicaid SCHIP expansion.

[d]Calculation of per capita estimates is inappropriate.

contemplating lowering their corporate income tax rates can reasonably expect to receive significantly greater foreign investment as a consequence. Active tax avoidance on the part of international investors implies that taxable income conditional on investment levels also responds strongly to tax rate changes. The combination of these two effects reduces the budgetary cost to a single country that reduces its tax rate need not be very great, since a lower tax rate is accompanied by a larger tax base due both to greater investment and to greater taxable income associated with local investment. The incentive to reduce corporate tax rates in order to attract foreign direct investment has increased since the early 1980s, as levels of world foreign direct investment rose sharply during that time.

III. Economic Globalization and Tax Competition

It stands to reason that countries eager to attract tax bases might compete with each other by reducing tax rates, as a result of which taxes, and therefore government expenditures, are driven to inefficiently low levels. The likelihood of such an outcome depends on the tax instruments available to governments and the nature of the competitive environment. In order to evaluate this prospect, it is helpful to consider the incentives that countries face.

Our understanding of the tax rate implications of international capital mobility dates to Diamond and Mirrlees (1971), who demonstrate that efficient taxation in a small open economy entails zero taxation of income earned by foreign investors. The explanation for their result is that any positive taxation distorts the economy more than other tax alternatives would, without shifting any of the tax burden to foreign investors.[7] If international capital flows are increasingly sensitive to tax rate differences, then incentives to reduce tax rates are presumably rising as well. The analysis also implies that countries that nevertheless persist in taxing income earned by foreign investors will have lower incomes than those that do not.

The Diamond and Mirrlees result is commonly thought to imply that small countries have the least to gain from attempting to impose taxes on investment. Small countries are believed to face the most elastic corporate tax bases and therefore to have the strongest incentives to offer low corporate tax rates, despite possible mitigating factors such as strategic behavior and distortions induced by other policies. While there are few tests of the proposition that the supply of capital to small countries is more elastic than the supply of capital to large countries, this is more than a matter of faith since, in most models, it follows as an implication

of their relatively small domestic business tax bases (see, e.g., Bucovetsky 1991). Whether countries actually design their policies on the basis of these presumed elasticities is another matter.

Larger countries have stronger incentives to tax foreign investors since they are able to extract some rents by virtue of the fact that prices in their economies need not respond to tax policies in a way that maintains unchanged the investors' after-tax profit margins. Possibly weighing against this is strategic competition among large countries, whose tax policies may be designed in a way that reflects their likely effects on the policies of other countries. Another consideration is that the inability to tailor tax and other policies perfectly might change efficient levels of taxation from what they would be in the absence of other distortions. For example, trade barriers may distort local prices and thereby influence the efficient taxation of foreign direct investment. If countries are unable to impose corrective taxes or subsidies on externality-producing activities of corporations, then modifications to corporate income tax rates might serve as indirect remedies. Similarly, if personal income taxation cannot be tailored to achieve efficient redistribution, then there may be circumstances in which efficient third-best tax policies might include distortionary corporate taxes. Finally, large countries might have personal income tax rates that differ from those in small countries. Efforts to align top personal and corporate tax rates in order to prevent tax arbitrage would then produce correlations between corporate tax rates and country sizes that stem from the determinants of personal income tax rates rather than efficient taxation of inbound foreign investment.

Several country-specific considerations therefore affect the consequences of taxing internationally mobile capital. It is noteworthy that, even in the absence of special considerations, international tax competition may produce outcomes in which capital taxes are higher than they would be in the absence of competition. This can happen when there is foreign ownership of productive factors, when competing countries differ greatly in size, or when multiple governments attempt to tax the same income sources.

The case of foreign ownership is clear: governments that care only about the welfare of domestic residents have incentives to adopt policies that enrich residents at the expense of foreigners. Foreign ownership of local firms may encourage governments to raise local capital tax rates above the levels they would impose in the absence of economic openness, since much of the tax burden is borne by owners to whom the taxing government is largely indifferent. Even foreign ownership of local land may trigger higher corporate tax rates if the burden of corporate

taxes is in part borne by landowners in the form of lower prices. Finally, governments may have incentives to overtax the foreign earnings of domestic companies, since doing so discourages foreign investment and thereby directs resources to the home economy, a valuable exchange in the presence of tax or other distortions.[8] If all governments respond to these incentives, then the result is that capital can be overtaxed in equilibrium.

Competition among countries of differing sizes creates incentives for jurisdictions to choose tax policies strategically to manipulate international prices to their own advantage. As DePater and Myers (1994) note, large capital-importing countries have incentives to tax capital heavily in order to reduce capital demand and therefore depress the world price of capital that domestic importers must pay. By the same reasoning, capital-exporting countries have incentives to subsidize capital investment in order to raise prices; but if the exporting countries are smaller than the importers, it may not be in the interest of any individual exporter acting on its own to offer such subsidies. The result is that international tax competition produces higher average capital tax rates than in the absence of competition.

What is the likely impact of tax competition on tax rates and government revenues? In a simple setting of symmetric countries, no special considerations or distortions, no foreign ownership, and governments that must finance all their expenditures with capital income taxation, Bucovetsky and Wilson (1991) confirm that international competition reduces government revenue and expenditures below efficient levels that would be chosen in the absence of competition. Oates and Schwab (1988) note that this conclusion depends critically on the assumption that governments do not have access to revenue sources other than capital income taxes, since the availability of nondistortionary alternatives eliminates any impact of capital taxes on government spending levels. Since governments rely on many revenue sources other than capital income taxes, since foreign ownership is common, countries differ in size, and tax policies are often used to correct economic distortions that cannot be more easily addressed some other way, it is possible for greater international economic mobility not to depress total government revenues.

Governments unable to raise significant amounts of revenue by taxing mobile business income may be able to use other taxes, but the revenue potentials of some alternatives to business taxes are to a lesser degree also limited by international considerations. In the case of personal income taxes, the ability to use international financial transactions may facilitate tax avoidance by high-income taxpayers, and international mobility of

individuals and their earnings increases the mobility of the personal income tax base.[9] Furthermore, downward pressure on business tax rates created by international competition is likely to exert downward pressure on top personal income tax rates also, because of the ability of taxpayers to select the forms of business organization. Top personal income tax rates that greatly exceed top corporate income tax rates create incentives for individuals to create corporations financed with personal investments that effectively convert personal income into corporate income, thereby undermining the revenue potential of high personal tax rates and in the process inefficiently directing their investments (Gordon and Mackie-Mason 1995). In response to this possibility, many governments are loath to introduce significant distinctions between top personal and business tax rates.

Taxing personal income entails taxing the returns to capital, which in turn reduces incentives to save and invest. The modern theory of capital accumulation notes that the imposition of capital income taxes creates inefficiencies by introducing growing tax wedges between consumption early in life and consumption many years later.[10] The inefficiencies associated with taxing capital income are in no way mitigated, and are quite possibly increased, by the availability of international capital markets that make the supply of capital investment opportunities close to perfectly elastic.[11] Consequently, greater access to world capital markets increases the efficiency costs associated with income taxation.

IV. World Patterns

The United States has a smaller government than many of its peer nations in the OECD, and the composition of U.S. tax revenues likewise differs significantly from those of other countries. Table 3 presents OECD data on government finances of OECD countries in 2004. In that year U.S. tax revenues were 25.5% of GDP, significantly lower than the OECD average of 35.9% and the E.U. average of 39.7%. Personal income taxes accounted for 34.7% of U.S. tax receipts, significantly higher than the OECD average of 24.6%. The United States raised 8.7% of its total tax receipts from corporate income taxes, a shade lower than the OECD average of 9.6%, but raised only 18.3% of total tax revenue from taxes on goods and services, compared with 32.3% for OECD countries as a whole.

A major reason that the United States relies so much less than other countries do on taxing goods and services is that, alone among OECD nations, the United States does not have a value-added tax, which is a

Table 3
Tax Collections in OECD Countries, 2004

	Total Tax Receipts as a Percentage of GDP	Percentage of Total Tax Receipts from		
		Personal Income Tax	Corporate Income Tax	Taxes on Goods and Services
Australia	31.2	40.2	18.2	28.5
Austria	42.6	22.7	5.4	28.2
Belgium	45.0	30.6	8.0	25.0
Canada	33.5	35.1	10.3	25.9
Czech Republic	38.4	12.7	12.4	31.2
Denmark	48.8	50.7	6.5	32.7
Finland	44.2	30.5	8.1	31.7
France	43.4	17.0	6.3	25.6
Germany	34.7	22.8	4.5	29.2
Greece	35.0	13.8	9.4	37.1
Hungary	38.1	17.8	5.8	40.8
Iceland	38.7	36.9	3.3	41.1
Ireland	30.1	27.4	11.9	37.8
Italy	41.1	25.4	6.9	26.4
Japan	26.4	17.8	14.2	20.0
Korea	24.6	13.6	14.3	36.3
Luxembourg	37.8	17.8	15.3	30.4
Mexico	19.0	24.6	…[a]	55.5
Netherlands	37.5	16.4	8.2	32.0
New Zealand	35.6	41.0	15.5	33.8
Norway	44.0	23.5	22.6	29.7
Poland	34.4	12.0	5.8	36.0
Portugal	34.5	15.9	8.3	38.6
Slovak Republic	30.3	9.3	8.1	39.8
Spain	34.8	17.7	9.8	28.0
Sweden	50.4	31.4	6.3	25.8
Switzerland	29.2	34.8	8.6	23.7
Turkey	31.3	14.9	7.3	47.7
United Kingdom	36.0	28.7	8.1	32.0
United States	25.5	34.7	8.7	18.3
E.U. average	39.7	24.6	8.2	30.7
OECD average	35.9	24.6	9.6	32.3

[a]Not available.

sophisticated form of a sales tax. For most of the world the major tax event of the late twentieth century is the widespread adoption of value-added taxes. Whereas by 1966 only two countries had introduced value-added taxes, by 1985, 35 countries had done so, and in 2004, 134 countries collected significant tax revenue with value-added taxes. Every OECD country other than the United States taxes value-added, at rates that average 17.7%, and that range from Denmark, Hungary, and Sweden

at the high end imposing 25% value-added tax rates to Japan, Canada, and Switzerland at the low end all using value-added tax rates in the 5.0–7.5% range.

Table 4 presents information on top personal and corporate tax rates among OECD countries in 2004. The U.S. top personal tax rate of 41.4% is almost identical to the OECD average of 41.3%, though the U.S. corporate tax rate of 39.3% is the highest among OECD countries, significantly

Table 4
Tax Burdens in OECD Countries, 2004

	Highest Rates of Income Taxes		Disposable Income of Average Production Worker (Percentage of Gross Pay)	
	Personal Income Tax (%)	Corporate Income Tax (%)	Single Person	Married with Two Children
Australia	48.5	30.0	76.3	89.9
Austria	42.9	34.0	67.0	82.1
Belgium	45.1	34.0	58.1	78.1
Canada	46.4	36.1	76.1	87.8
Czech Republic	28.0	28.0	76.2	95.9
Denmark	55.0	30.0	59.1	71.0
Finland	50.3	29.0	68.9	76.9
France	36.7	35.4	71.2	83.0
Germany	47.5	38.9	56.5	76.7
Greece	33.6	35.0	77.5	77.0
Hungary	56.0	16.0	65.6	80.3
Iceland	42.0	18.0	74.7	94.6
Ireland	42.0	12.5	83.1	102.5
Italy	41.4	33.0	72.7	85.7
Japan	47.2	39.5	81.8	84.9
Korea	36.6	29.7	90.1	91.3
Luxembourg	33.9	30.4	73.5	99.6
Mexico	26.4	33.0	94.8	94.8
Netherlands	52.0	34.5	67.5	77.7
New Zealand	39.0	33.0	80.0	82.0
Norway	47.5	28.0	69.9	79.2
Poland	26.2	19.0	68.2	70.1
Portugal	35.6	27.5	78.2	89.8
Slovak Republic	16.5	19.0	77.8	97.2
Spain	45.0	35.0	80.0	87.6
Sweden	56.5	28.0	68.5	75.9
Switzerland	37.8	24.1	78.4	90.6
Turkey	40.6	33.0	69.5	69.5
United Kingdom	40.0	30.0	73.4	80.5
United States	41.4	39.3	76.6	95.5
E.U. average	43.8	31.1	70.3	82.9
OECD average	41.3	29.8	73.7	84.9

exceeding the OECD average of 29.8%. By the OECD's calculations, the U.S. tax burden on an average production worker reduces disposable income to 76.6% of take-home pay for single individuals and 95.5% of income for families with two children, in both cases representing smaller tax burdens than the OECD average.

A. Income Taxes

The United States is typical among large countries in relying heavily on personal income taxes and corporate income taxes to finance government expenditures. Figure 1 presents information from the International Monetary Fund (IMF) Government Finance Statistics on fractions of total national tax revenue accounted for by the sum of personal income taxes and corporate income taxes. The top panel of figure 1 presents two loci: the triangles represent averages for the quarter of the sample of countries with the smallest populations, and the squares represent averages for the quarter of the sample of countries with the largest populations. This is an unbalanced panel, since country coverage in the IMF data varies a bit from year to year; and to a lesser degree, differential population growth rates change the identities of the largest and smallest countries over time.

It is clear from the bottom panel of figure 1 that large countries rely most heavily on income taxes. In a typical early year, such as 1972, the average large country drew 41.6% of its total tax revenue from personal and corporate income taxes, whereas the comparable figure for the average small country was 34.5%. These differences have not narrowed over time: by 2003, income taxes accounted for 43.9% of tax revenue in large countries and only 27.5% of revenue in small countries.

One of the difficulties of interpreting the information in the top panel of figure 1 is that the composition of large and small countries in the sample changes over time as populations change and IMF data availability fluctuates. The bottom panel of figure 1 presents the same information for a balanced panel of countries between 1973 and 2001, a span of time over which the IMF data are most plentiful. Countries in this sample are assigned to the top size quartile and bottom size quartile on the basis of their 1973 populations. As is evident from the figure, differences in the extent to which small and large countries rely on personal income taxes have increased over time. In 1973 the larger countries in this sample raised an average of 41.5% of their tax revenue from personal and corporate income taxes, whereas smaller countries raised only 31.2% of their tax revenue from income taxes. By 2001, larger countries relied on personal and corporate income taxes for 48.9% of

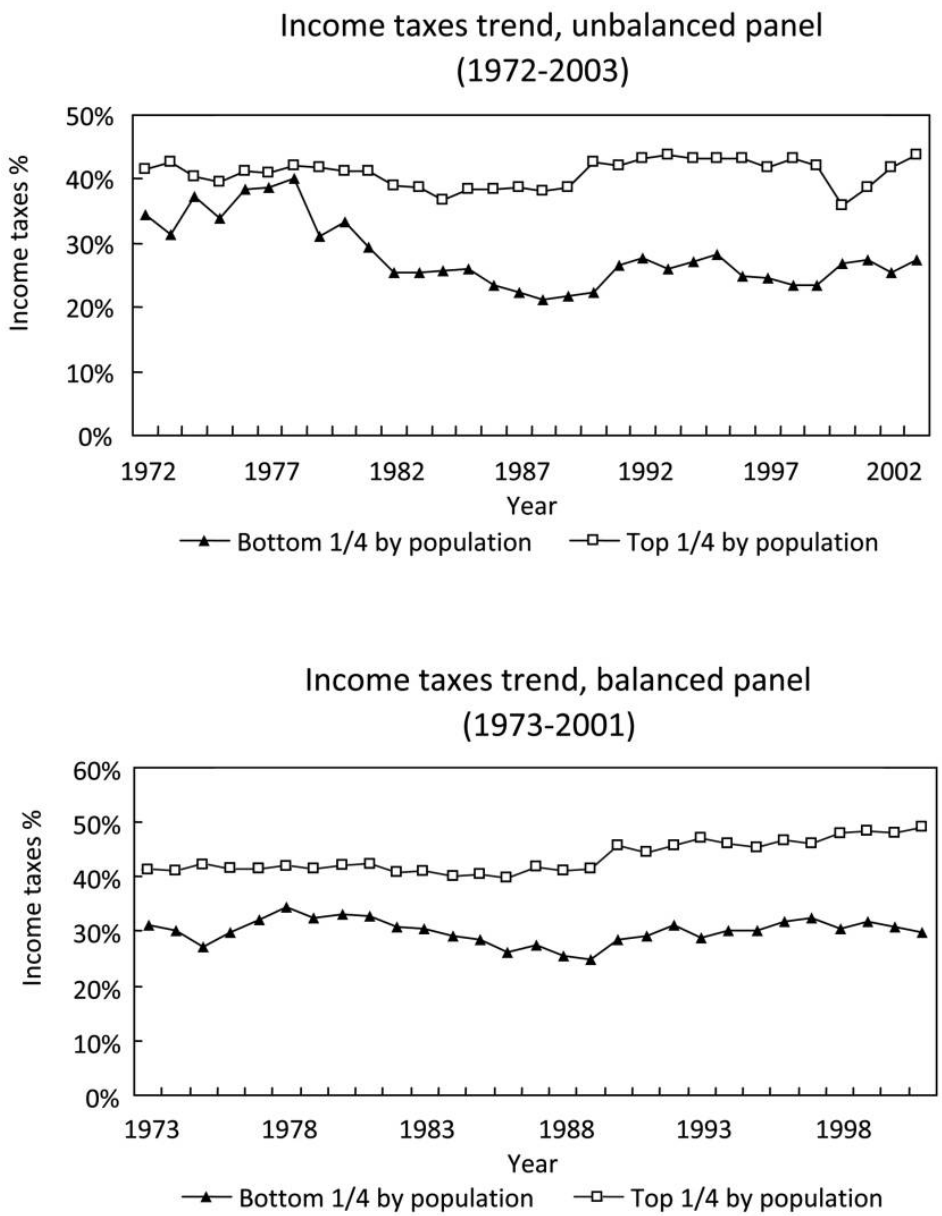

Fig. 1. Income taxes in small and large countries. The two panels depict the sum of personal and corporate income taxes as fractions of total national tax revenue for samples of small and large countries.

their tax revenues, and smaller countries relied on income taxes for 29.9%.

The reason to distinguish countries by size is that economic openness is commonly thought to be a function of country size: there are good reasons to believe that large countries have internal markets that are larger as fractions of their total markets than is the case for smaller countries. The IMF evidence is consistent with this interpretation, since

the standard measure of economic openness (the ratio of a country's exports plus imports divided by its GDP) is negatively correlated with country size. Appendix table A1 presents annual cross-sectional correlations between country sizes (as measured by log population) and the standard measure of economic openness; between 1972 and 2006, this correlation varies between −0.32 and −0.22 and is always statistically significant.

It is possible to compare the tax policies of countries with differing degrees of openness, though one of the difficulties of such a comparison is that import and export performance is arguably affected by a country's tax policies and therefore is not entirely appropriate as an independent source of variation. It is nevertheless instructive to consider such a comparison, as presented in figure 2. The evidence in the top panel of figure 2 is that since the early 1980s, countries with less open economies (as measured by ratios of exports plus imports to GDP) have relied more heavily on income taxes than countries with more open economies. This difference is more pronounced in the balanced panel comparison presented in the bottom panel of figure 2, where, if anything, the difference between reliance on income taxes by countries with open and closed economies has widened over time.

The IMF data distinguish income tax revenues by personal and corporate taxes, though with spotty coverage and some uncertainty over which revenues are allocated to each category. As a result, any analysis of corporate or personal income taxes in isolation must be treated with some caution. The top panel of figure 3 presents information on differences in the extent to which a balanced panel of large and small countries rely on corporate tax revenue over the 1973–99 period for which data are most plentiful; this evidence illustrates the persistent pattern that smaller countries collect significantly less corporate tax revenue as fractions of total taxes. The bottom panel of figure 3 presents similar information for open and closed economies over the 1975–98 period, with less open economies relying to greater degrees on corporate tax sources.

Table 5 presents evidence of the impact of country size and affluence on the extent to which countries rely on personal and corporate income taxes.[12] The table presents six cross-sectional regressions, two for 1973, two for 1985, and two for 1999; the dates were chosen with the goals of covering a wide range of years and also maintaining sizable country coverage for the regressions. The regression in column 1 suggests that larger and more affluent countries may have relied more heavily than other countries on personal and corporate income taxes in 1973, though the estimated coefficients are not statistically significant. In the regression

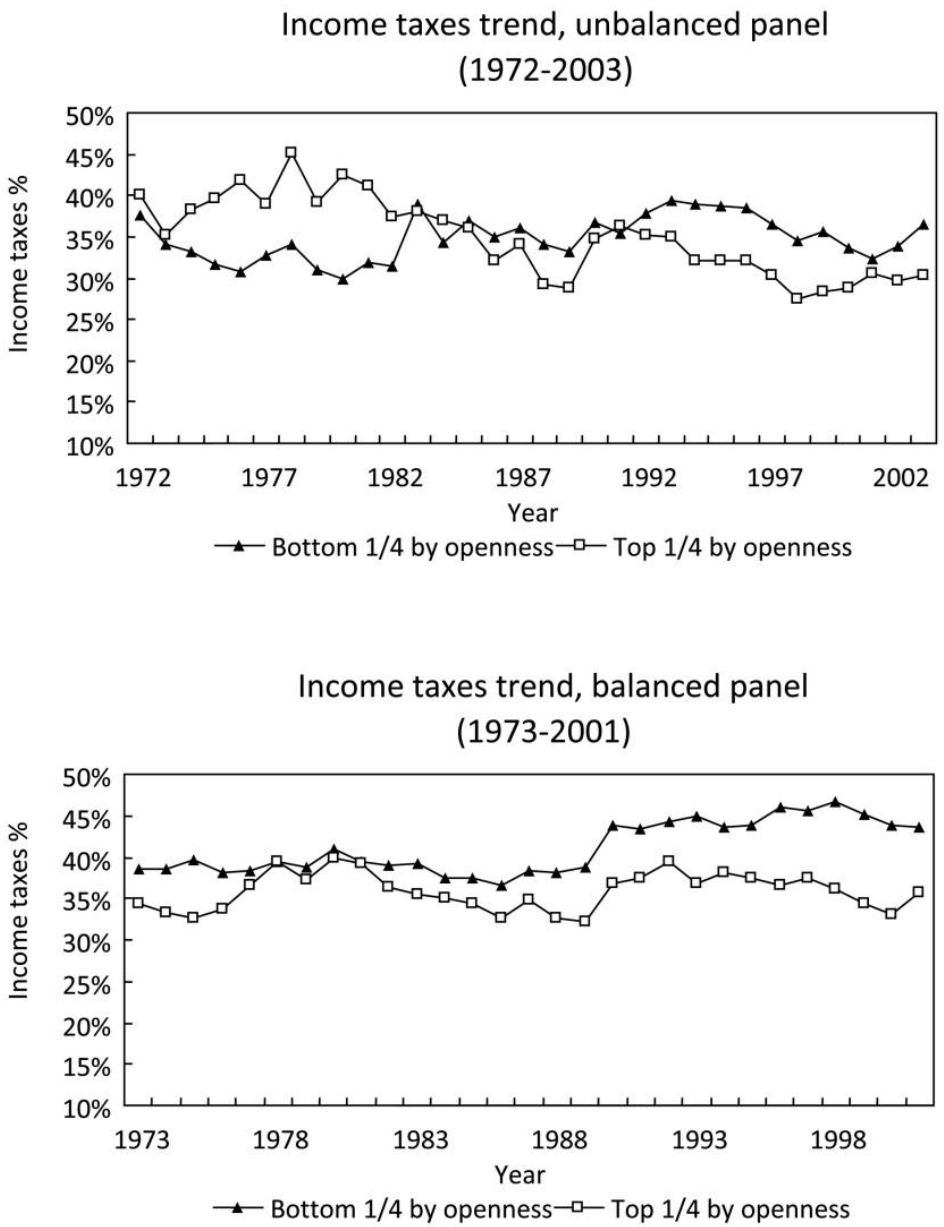

Fig. 2. Income taxes in countries with open and closed economies

for 1985 presented in column 3, country sizes and levels of affluence have more statistical power in explaining the use of income taxes. The 0.019 coefficient implies that doubling a country's population is associated with a 1.9% higher ratio of income taxes to total tax collections, and the 0.053 coefficient implies that wealthier countries rely more heavily on income taxes.

The regressions reported in columns 5 and 6 of table 5 indicate that the effect of country size became stronger by 1999. The 0.051 coefficient

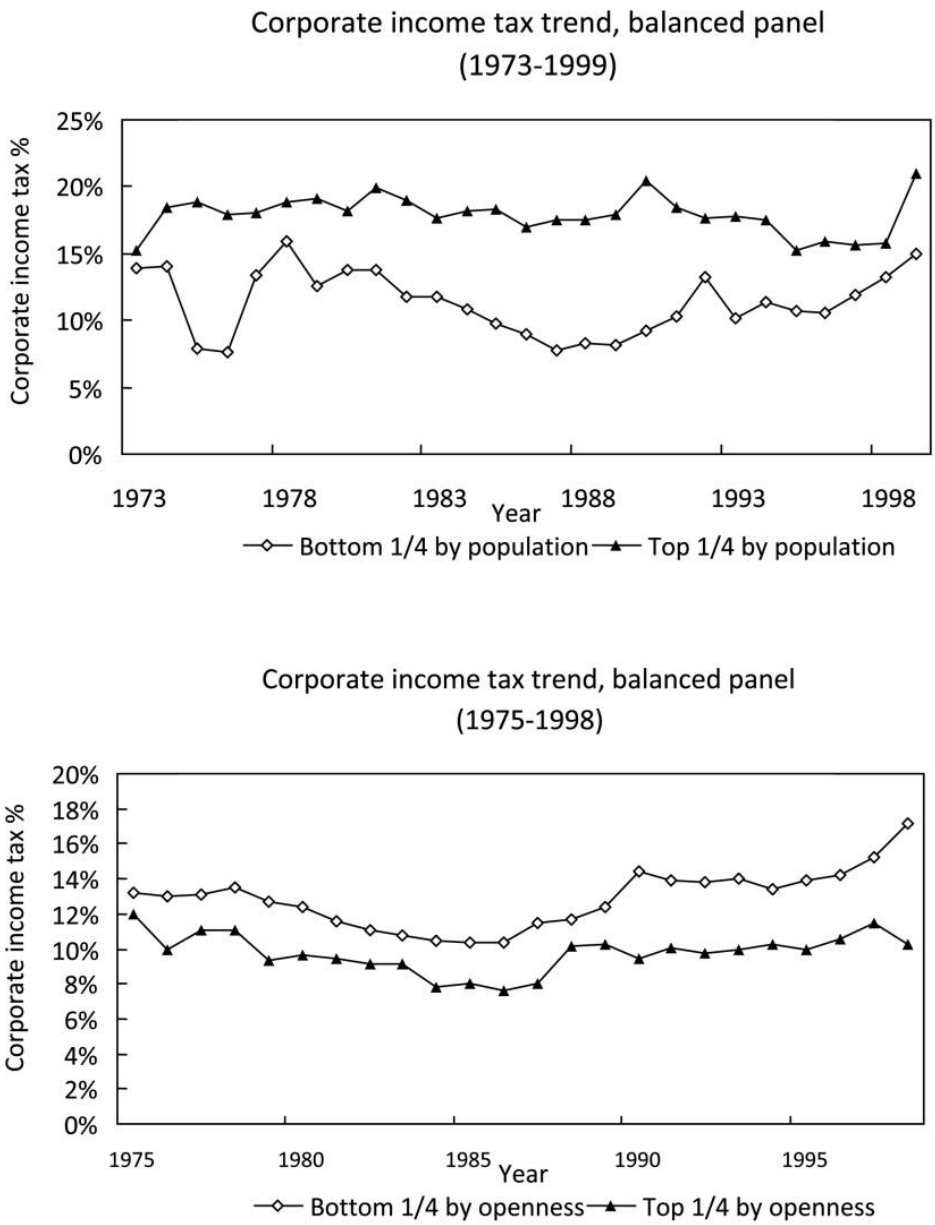

Fig. 3. Corporate income taxes in countries with small and open economies

in column 5 is very similar to the corresponding 0.053 coefficient in column 3, but the statistically significant 0.042 coefficient in column 5 indicates that doubling a country's population is associated with a 4.2% higher ratio of income taxes to total taxes, corresponding to roughly a 10% greater reliance on income taxes. The regression reported in column 6 reveals that the effects of country size and affluence are concentrated in their interaction: the 0.015 coefficient on the interaction term is large and statistically significant, whereas the estimated coefficients

Table 5
Dependent Variable: Fraction Total Tax Revenue from Income Taxes, Personal and Corporate

	1973		1985		1999	
	(1)	(2)	(3)	(4)	(5)	(6)
ln(population)	.025	.049	.019	−.063	.042	−.081
	(.015)	(.090)	(.010)	(.059)	(.009)	(.053)
ln(per capita GDP)	.016	.069	.053	−.117	.051	−.197
	(.016)	(.196)	(.015)	(.122)	(.011)	(.106)
ln(population) × ln(per capita GDP)		−.003		.011		.015
		(.012)		(.008)		(.007)
Observations	64	64	77	77	71	71
R^2	.0531	.0542	.1787	.2003	.3492	.3984

on the uninteracted population and per capita income variables are negative.

It is possible to use the panel nature of the data to identify the impact of changes in population and income levels on the use of personal and corporate income taxes. The panel estimates include country and year fixed effects, which absorb the impact of persistent differences between countries and common effects of changes over time. In estimating these relationships in a panel framework, it is necessary to normalize for the persistent increases in population and income levels that characterize the experience of most countries between 1972 and 2006. In the panel regressions that follow, the log income, log population, and interaction of log income and log population variables are normalized by dividing them by annual means of these variables, as a result of which the means of the regression variables are (by construction) one in each year (and for the sample as a whole).

Table 6 presents panel estimates of the determinants of personal and corporate income tax collections as a fraction of total taxes. These regressions include year and country fixed effects and represent an unbalanced panel, in that not every country is included every year.[13] At a first look the evidence in column 1 of table 6 gives a rather different impression than the cross-sectional regressions in table 5. As in the cross-sectional regressions, higher income levels are associated with greater use of personal income taxes, the 0.257 coefficient in column 1 implying that doubling a country's income level is associated with a 25.7% higher ratio of personal taxes to total taxes. The striking −2.985 coefficient in the same column, however, implies that high levels of national population growth are associated with reduced use of personal income taxes. Introduction of

Table 6
Income Tax Revenues over Time

	Fraction from Income Taxes			
	(1)	(2)	(3)	(4)
Normalized ln(population)	−2.985	−2.789	−.006	2.996
	(.358)	(.530)	(.457)	(.753)
Normalized ln(GDP)	.257	.447	.418	2.976
	(.043)	(.383)	(.044)	(.529)
Interaction of normalized population and GDP		−.183		−2.447
		(.366)		(.507)
Normalized ln(population) × time			.021	−.031
			(.002)	(.012)
Normalized ln(GDP) × time			.011	−.043
			(.001)	(.012)
Interaction of normalized population and GDP × time				.052
				(.011)
Observations	2,353	2,353	1,891	1,891
R^2	.8063	.8063	.8201	.8243

Note: The dependent variable is the fraction of total tax collections from income taxes. Population and income variables are normalized to have unit means in each year. The data are an unbalanced panel covering 1972–2006, and the regressions include year and country dummy variables (not reported). The time variable takes the value one in 1972 and 35 in 2006.

a variable capturing the interaction of country size and affluence in the regression reported in column 2 changes these results rather little.

One question raised by these regression results is the extent to which the effects of income and population may change over the 1972–2006 time period. The regression reported in column 3 introduces additional variables that interact starting (1972) population and income levels with time, where time is a variable taking the value one in 1972 and 35 in 2006. Introduction of these time interaction variables somewhat enhances the estimated size of income effects, as reflected in the 0.418 coefficient in column 3. The 0.011 coefficient on the interaction of time and normalized income indicates that countries that were more affluent in 1972 tended to increase their use of income taxes over the sample period compared to other countries.

Introducing time interactions has a more striking effect on estimated population effects. The estimated coefficient on normalized population is small and insignificant in the regression reported in column 3, whereas the 0.021 coefficient on the interaction of time and initial population indicates that countries with small populations in 1972 relied to declining degrees on income taxes over time. Introducing interactions between population and income in the regression reported in column 4 reveals that wealthy large countries made greater use of income taxes over time, as reflected in the estimated 0.052 coefficient.

B. Expenditure Taxes

Figure 4 presents ratios of expenditure taxes—the sum of indirect taxes on goods and services and international trade taxes (chiefly tariffs)—to total tax revenue. It is evident from both the unbalanced and balanced panels displayed in figure 4 that small countries finance much more of their governments through expenditure taxes than large countries do.

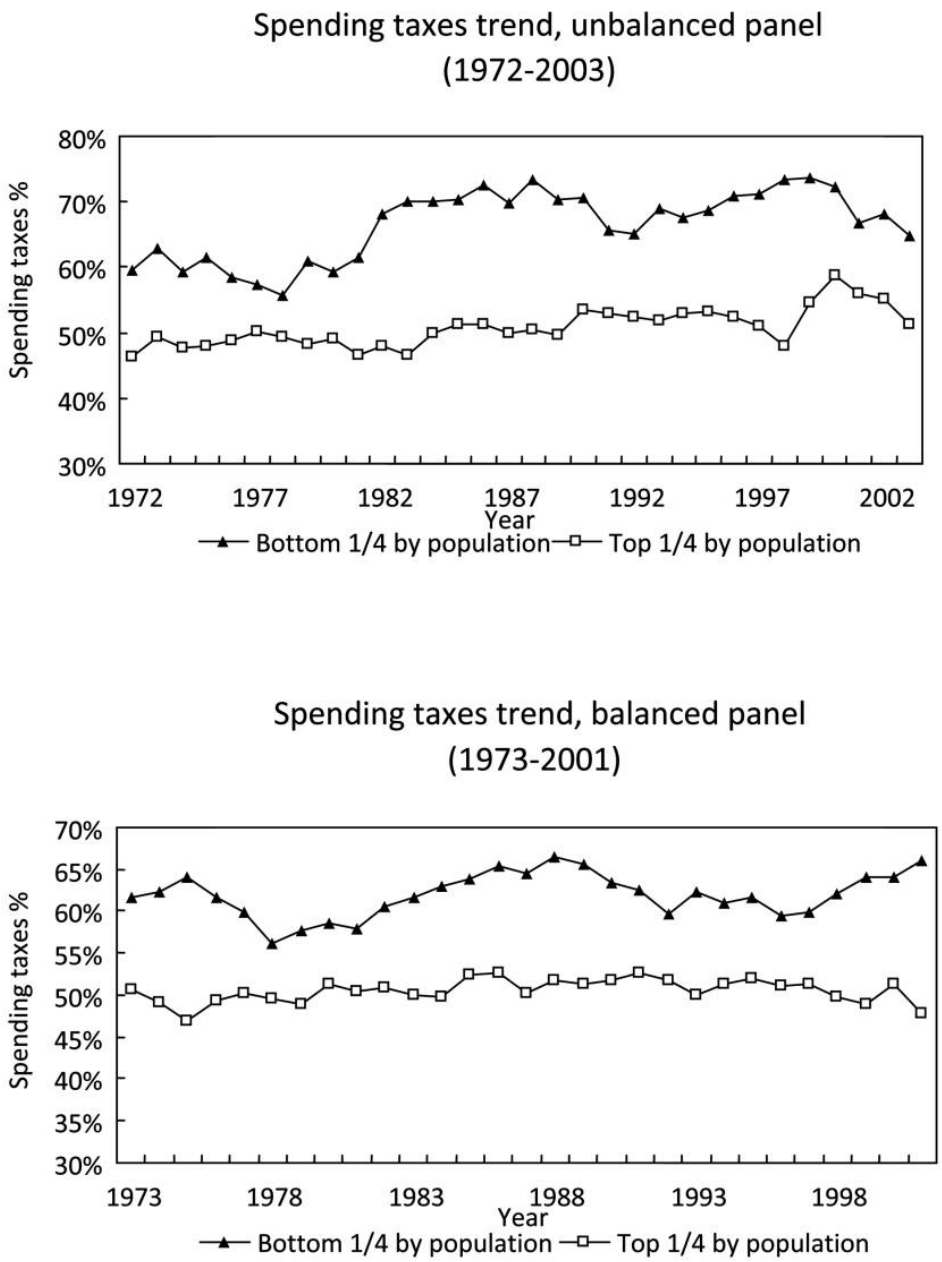

Fig. 4. Expenditure taxes in small and large countries

The information in the lower panel of figure 4 suggests that differences related to country sizes have not fallen over time, but instead remain quite substantial.[14]

Figure 5 compares the use of expenditure taxes by countries with more and less open economies. The evidence presented in the top panel of figure 5 suggests that more open economies have relied relatively heavily on expenditure taxes since the early 1980s, though this was not true prior

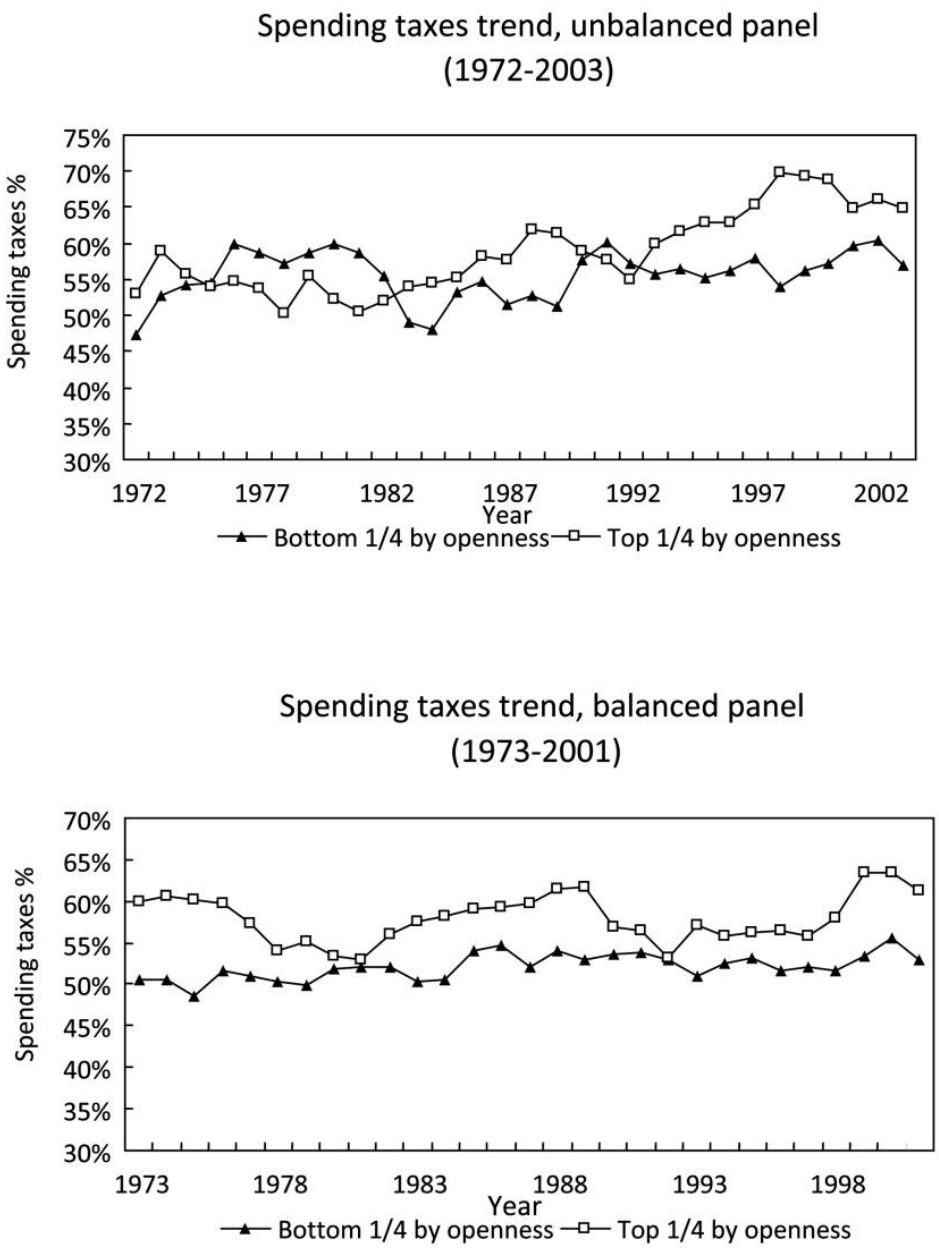

Fig. 5. Expenditure taxes in countries with open and closed economies

to that. Evidence from the balanced panel of countries displayed in the bottom panel of figure 5, however, indicates that more open economies have consistently used expenditure taxes to greater degrees than less open economies.[15]

Table 7 presents evidence that country size and per capita income are consistently associated with smaller ratios of expenditure taxes to total tax revenues.[16] The −0.041 coefficient in column 1 implies that doubling a country's population in 1973 is associated with a 4.1% smaller ratio of expenditure taxes to total tax revenue; and the −0.048 coefficient similarly implies that doubling a country's per capita income is associated with a 4.8% smaller ratio of expenditure taxes to total tax revenue. These effects persist in the regressions for 1985 and 1999, presented in columns 3–6 of table 7, indicating that expenditure taxes are most heavily used by small and poor countries.

The panel evidence, reported in table 8, is quite consistent with the cross-sectional evidence appearing in table 7. The −0.442 coefficient reported in column 1 implies that growing income levels are associated with reduced reliance on expenditure taxes, and the −1.435 coefficient indicates that population growth is likewise associated with less use of expenditure taxes. Inclusion of an interaction between population and income in the regression reported in column 2 changes these results very little, though the estimated income effect becomes statistically insignificant. And adding interactions between time and initial income and population levels in the regressions reported in columns 3 and 4 again does little to change the implications of the regression reported in column 1, that countries whose populations and income levels grow smaller make greater relative use of expenditure taxes.

Table 7
Dependent Variable: Fraction Total Tax Revenues from Expenditure Taxes (Sum of Goods and Trade Taxes)

	1973		1985		1999	
	(1)	(2)	(3)	(4)	(5)	(6)
ln(population)	−.041	.012	−.033	.072	−.044	.022
	(.013)	(.075)	(.010)	(.058)	(.010)	(.058)
ln(per capita GDP)	−.048	.069	−.098	.121	−.054	.078
	(.014)	(.164)	(.015)	(.120)	(.012)	(.116)
ln(population) × ln(per capita GDP)		−.007		−.014		−.008
		(.010)		(.007)		(.007)
Observations	64	64	77	77	70	70
R^2	.2627	.2690	.4221	.4477	.3500	.3627

Table 8
Expenditure Tax Revenues over Time

	Fraction from Expenditure Taxes			
	(1)	(2)	(3)	(4)
Normalized ln(population)	−1.435	−1.584	−1.210	−2.533
	(.382)	(.565)	(.509)	(.847)
Normalized ln(GDP)	−.442	−.587	−.397	−1.552
	(.046)	(.407)	(.049)	(.593)
Interaction of normalized population and GDP		.139		1.110
		(.389)		(.568)
Normalized ln(population) × time			−.008	−.005
			(.002)	(.013)
Normalized ln(GDP) × time			−.0004	.003
			(.001)	(.013)
Interaction of normalized population and GDP × time				−.003
				(.013)
Observations	2,345	2,345	1,883	1,883
R^2	.8109	.8109	.8045	.8049

Note: The dependent variable is the fraction of total tax collections from expenditure taxes. Population and income variables are normalized to have unit means in each year. The data are an unbalanced panel covering 1972–2006, and the regressions include year and country dummy variables (not reported). The time variable takes the value one in 1972 and 35 in 2006.

V. Implications

The international evidence indicates that governments of countries with smaller and more open economies rely less on personal and corporate income taxes, and more on expenditure and trade taxes, than other governments do. Doubtless this reflects many aspects of their economic and political situations, including that properly designed expenditure-type taxes (though typically not trade taxes) can create fewer economic distortions than many income taxes.

The United States currently taxes personal and corporate income at high rates compared to other countries, particularly given the relatively small size of the U.S. public sector. As the world economy becomes more integrated, the cost of this type of income taxation will grow relative to the cost of expenditure tax alternatives. There has been consistent U.S. resistance to the prospect of introducing extensive expenditure taxation of the type embodied in value-added taxes or reform of the personal income tax that would give it explicit expenditure tax features. One of the political obstacles that a value-added tax or any other broad-based consumption tax must overcome in the United States is the concern, in some circles, that such taxes are too efficient at raising revenue,

that they too easily accommodate big government. While there is little in the way of econometric support for the notion that the adoption of a value-added tax encourages government growth (see, e.g., Metcalf 1995), it is noteworthy that Michigan, the only state in the country to use a value-added tax instead of a corporate income tax, taxed businesses more heavily than any other state during the years in which its value-added tax was in place (Hines 2003). In an era in which governments face growing demands for their services and in which other sources of tax revenue confront growing challenges and are increasingly inefficient, it may not be surprising that governments all over the world have come to rely more heavily on expenditure taxes to meet their revenue needs.

Distributional issues present some of the greatest challenges of globalization, since growing international trade and investment affect income distributions directly by changing relative prices and indirectly by affecting the range of feasible government policies. In practice many expenditure taxes are considerably less progressive than income tax alternatives, so movement away from income taxation and in the direction of greater expenditure taxation is typically associated with less equal after-tax distributions of income. Governments that are concerned about growing income inequality and that feel pressured to move their tax systems more strongly in the direction of expenditure taxation therefore can be expected to look for progressive alternatives to standard policy choices. Such alternatives may include progressive forms of expenditure taxation and expenditure policies, such as education and training programs, that support income creation by less affluent members of the population.

The fiscal challenges facing governments in the era of globalization are unlikely to be addressed with single answers such as expanded education programs, but instead strategies that include broad ranges of government policy initiatives. International agreements have the potential to play significant roles in these strategies. It is already the case that governments cooperate in international settings such as the World Trade Organization to promote international trade and investment, and bilateral and multilateral tax agreements and initiatives serve the function of facilitating tax enforcement and avoidance of double taxation of international income. Doubtless governments will come to rely more heavily on international agreements in the years to come, but it remains to be seen whether they will accelerate or offset the recent trend in the direction of expenditure taxation.

Appendix

Table A1
Annual Correlations between Country Size and Measured Openness

Year	Observations	Correlation (r)	p-Value
1972	96	−.3221	.0014
1973	100	−.3231	.0010
1974	102	−.3254	.0008
1975	108	−.3127	.0010
1976	110	−.3002	.0014
1977	111	−.3113	.0009
1978	114	−.3274	.0004
1979	113	−.3247	.0005
1980	119	−.3098	.0006
1981	119	−.3049	.0007
1982	120	−.2998	.0009
1983	121	−.2895	.0013
1984	122	−.2881	.0013
1985	124	−.3126	.0004
1986	125	−.3010	.0006
1987	126	−.2994	.0007
1988	127	−.2877	.0010
1989	127	−.2858	.0011
1990	130	−.2817	.0012
1991	134	−.2657	.0019
1992	136	−.2525	.0030
1993	143	−.2786	.0008
1994	145	−.2982	.0003
1995	147	−.2910	.0003
1996	148	−.2804	.0006
1997	151	−.2449	.0024
1998	149	−.2369	.0036
1999	147	−.2552	.0018
2000	147	−.2563	.0017
2001	146	−.2593	.0016
2002	145	−.2545	.0020
2003	142	−.2558	.0021
2004	139	−.2452	.0036
2005	130	−.2380	.0064
2006	106	−.2161	.0261

Table A2
Means and Standard Deviations for Cross-Sectional Regressions in Table 5

Specification(s)	Variable	Mean	Median	Standard Deviation	Observations
(1), (2)	ln(population)	15.650	15.712	1.697	64
(1), (2)	ln(per capita GDP)	6.757	6.828	1.601	64
(2)	ln(population) × ln(per capita GDP)	105.67	99.67	28.20	64
(3), (4)	ln(population)	15.573	15.807	2.078	77
(3), (4)	ln(per capita GDP)	7.614	7.596	1.366	77
(4)	ln(population) × ln(per capita GDP)	118.54	117.51	26.79	77
(5), (6)	ln(population)	16.069	15.913	1.718	71
(5), (6)	ln(per capita GDP)	8.037	8.204	1.447	71
(6)	ln(population) × ln(per capita GDP)	128.82	126.17	25.78	71

Table A3
Means and Standard Deviations for Cross-Sectional Regressions in Table 6

Specification(s)	Variable	Mean	Median	Standard Deviation	Observations
(1), (2)	Normalized ln(population)	1	1.003	.117	2,353
(1), (2)	Normalized ln(GDP)	1	1.001	.171	2,353
(2)	Interaction of normalized population and GDP	1	.981	.202	2,353
(3), (4)	Normalized ln(population)	1	.999	.109	1,891
(3), (4)	Normalized ln(GDP)	1	1.002	.172	1,891
(4)	Interaction of normalized population and GDP	1	.974	.197	1,891
(3), (4)	Normalized ln(population) × time	15.5	14.73	9.250	1,891
(3), (4)	Normalized ln(GDP) × time	15.5	14.40	9.722	1,891
(4)	Interaction of normalized population and GDP × time	15.5	14.24	9.891	1,891

Endnotes

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1. Rodrik (1998) offers evidence that open economies have larger government sectors than closed economies, which he attributes to their greater demand for public expenditures that cushion the effects of globalization.

2. See Avi-Yonah (2000) for an elaboration of this argument.

3. See Hummels (2007) for detailed evidence of the growth of world trade since 1950.

4. For recent surveys, see Gordon and Hines (2002), Devereux (2006), and Hines (2006), from which some of this material is drawn. For a fuller discussion of the tax rules facing U.S. multinational firms and the evidence on behavioral responses to international taxation of U.S. multinationals, see Hines (1997, 1999) and Desai, Foley, and Hines (2003).

5. For example, Altshuler, Grubert, and Newlon (2001) compare the tax sensitivity of aggregate capital ownership in 58 countries in 1984 to that in 1992, reporting estimated tax elasticities that rise (in absolute value) from –1.5 in 1984 to –2.8 in 1992. Altshuler and Grubert (2004) offer evidence of a –3.5 tax elasticity of investment in a sample of 58 countries in 2000.

6. For evidence on intrafirm trade, see Clausing (2001, 2003) and Swenson (2001). For evidence on intrafirm debt, see Grubert (1998), Desai, Foley, and Hines (2004), and Huizinga, Laeven, and Nicodeme (2006). For evidence on royalties, see Hines (1995) and Grubert (1998). For evidence on dividend repatriations, see Hines and Hubbard (1990) and Desai, Foley, and Hines (2001). See Grubert and Mutti (1991) and Hines and Rice (1994) for evidence on differences in reported profitability in response to tax rates. While these studies exclusively use data on U.S. multinationals, Bartelsman and Beetsma (2003) use country-level data within the OECD to identify the prevalence of profit-shifting activities more generally.

7. See Gordon (1986) for an elaboration of this argument and Gordon and Hines (2002) for a further exposition.

8. Huizinga and Nielsen (1997) analyze incentives to increase corporate tax rates when foreigners make local corporate investments, Richter and Wellisch (1996) consider the case of foreign-owned land, and Mintz and Tulkens (1996) analyze incentives to overtax foreign income.

9. For example, Gordon and Nielsen (1997) note that individuals have greater international tax avoidance opportunities under income taxation than under value-added taxation, and they use Danish data to estimate the magnitude of the difference.

10. See, e.g., Chamley (1986) and the discussion in Auerbach and Hines (2002).

11. See the discussion in Correia (1996).

12. Means and standard deviations of regression variables are presented in table A2.

13. Results for a balanced panel of data covering a smaller number of countries for 1973–99 are very similar to those reported for the larger unbalanced panel.

14. The expenditure tax patterns displayed in fig. 4, and the subsequent regressions, are more than simply the mirror images of the income tax evidence, since countries have access to many taxes other than income and expenditure taxes, including property taxes, estate and inheritance taxes, stamp duties, payroll taxes, and others.

15. This evidence in fig. 5 must be interpreted with caution, since expenditure taxes include trade taxes that themselves are likely to influence economic openness.

16. Means and standard deviations of regression variables are presented in table A3.

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